Spin-Flip Scattering at Quantum Hall Transition

Alexander CHUDNOVSKIY
Department of Physics
Hamburg University
Jungiusstr. 9
20355 Hamburg
GERMANY

We formulate a generalized Chalker--Coddington network model that describes the effect of nuclear spins on the two-dimensional electron gas in the quantum Hall regime. We find exact analytical expression for the transmission coefficient of a charged particle through a saddle point potential in presence of perpendicular magnetic field that takes into account spin-flip processes.

Spin-flip scattering creates a metallic state in a finite range around the critical energy of quantum Hall transition. As a result we find that the usual insulating phases with Hall conductance $\sigma_{xy}=0, 1, 2$ are separated by novel metallic phases.